INVESTMENT APPRAISAL

1. One of the main sources of economic growth is investment. Investment is required, not only to increase the total stock of equipment and buildings available but also to allow labour to be employed on increasingly productive jobs as old plant and machinery is replaced by new. The increase of the amount of capital available per worker and the improvement of its quality, together with investment in human capital—in the improvement of human abilities and knowledge through education and training—almost certainly account for much of the increase in output per worker. Economic growth is particularly dependent on investment when the labour force is growing slowly, as is expected to be the case in the United Kingdom for some years to come.

The importance of better methods of appraisal

2. All investment involves a sacrifice of present consumption to secure a future output higher than would otherwise be possible. It is thus important that the pattern of investment in the economy as a whole should be such as to bring the highest possible returns for any given level of total outlays.

3. This booklet concentrates on the criteria underlying decisions to invest in physical assets in private industry, though many of the points made below are relevant to decisions in the public sector also. In considering the rationality of such decisions, the problem has to be faced that the decision most favourable to the private firm *may* not always be the most beneficial to the community. It is here assumed, however, that fiscal and other policies are operated so as to ensure that social and private net returns from investment are, in fact, kept fairly well in line. However, there are grounds for concluding that the present attitudes of many businessmen to tax measures related to profits or investment income may mean that such measures do not, in fact, have the influence expected.

4. Investment allowances, initial allowances and free depreciation are ways used by the Government to reduce taxes on income from investment, conditionally on the investment being of a certain type (especially new plant and machinery) or in certain areas. Yet almost all the businessmen consulted by the Richardson Committee* stated that the possible changes in taxation discussed by the Committee (including the elimination of the profits tax) would have no effect on their investment programmes. They were broadly agreed that factors other than taxation largely determined investment decisions. Again, suggestions that schemes should be introduced to iron out oscillations in private investment, by tax adjustments on the lines of the Swedish system or that presented by the British machine tool

* Committee on Turnover Taxation, Cmnd. 2300, March, 1964.

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industry*, have encountered the objection that many British industrialists do not apparently yet fully understand, or react appropriately to, the simpler existing tax measures designed to influence investment. If businessmen indeed take little account of taxation in making their investment decisions, tax measures designed to encourage certain types of investment (such as those just mentioned) must lose much of their impact.

5. There is much additional evidence that, although the managements of most firms undoubtedly take their investment decisions only after careful consideration of the likely costs and benefits as they see them, these decisions are too often reached in ways which are unlikely to produce the pattern and/or level of investment most favourable to economic growth—or even most profitable to the firm.† Many firms appear to apply criteria for assessing investment projects which have little relevance to the measurement of the expected rate of return to the capital invested. Among such criteria in common use is the pay-back period, or the number of years taken to recoup the cost of the investment. Even when a rate of return to capital is calculated, the methods used vary widely and are sometimes so arbitrary as to give almost meaningless results. Failure to assess returns after, rather than before, tax is a frequent and important weakness of many widely-used methods.

6. If, as a result of the use of faulty methods of appraisal, investment decisions are made over-cautiously, possibly through too high a minimum rate of return being demanded before new plant is installed, there will be delay in introducing new methods and economic growth will be slow; if, on the other hand, investment decisions are made which result in a project being selected which yields an unduly low return, this results in a waste of limited capital resources and is again unfavourable to growth. There is reason to suppose that many of the methods of investment appraisal now in use tend to lead to under-investment in plant and machinery as opposed, for example, to investment in stocks.

7. Some of the main means of improving the less satisfactory current methods of investment appraisal are outlined in the remainder of this booklet. Most attention is given to the use of the most appropriate of the many possible definitions of the "rate of return"; and, in this context, special consideration is given to the impact of taxation, largely because the way in which this is assessed by any firm has today such an overwhelming

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* See N.E.D.C., "Conditions Favourable to Faster Growth", H.M.S.O., 1963, paragraph 174.

† A number of recent surveys of the present practices of industry in assessing investment projects provide such evidence:

H. Hart and D. Prussmann, "An account of Management Accounting and Techniques in the S.E. Hants Coastal Region" (the results have been partially published in the *Accountants' Journal*, January, 1964 and *Scientific Business*, November, 1964; mimeographed copies of the report are available on application to the Department of Commerce and Accountancy, University of Southampton).

D. C. Corner and A. Williams, "The Sensitivity of Businesses to Initial and Investment Allowances" (the main results are shortly to be published in *Economica*).

G. Lawson, "Criteria to be observed in Judging a Capital Project", *Accountants' Journal*, May and June, 1964.

Report of the Centre for Business Research, Manchester University (available on application to the Centre).

R. Nield, "Replacement Policy", *National Institute Economic Review*, November, 1964.

influence on the apparent profitability of projects which include a high proportion of outlays on new plant and machinery.

The assessment of the expected costs and revenues

8. The first step towards the correct assessment of the rate of return on capital to be invested in a given project is, on the one hand, a careful estimation of the various elements comprising its capital and operating costs and, on the other hand, a similar estimation of the various market factors which will determine future revenue. Ideally, both should be estimated year by year over the expected life of the project since it is unlikely that current costs and receipts, or the margin between them, will be the same in each year. Operating costs will normally tend to increase as requirements for maintenance and real labour costs rise (the latter being related to the expectation that real wages—money wages in relation to prices—will rise in the economy as a whole), though for a time there may be offsetting tendencies for unit costs to be reduced as plant is run in and capacity utilisation improves. The tendency for earnings to fall during the life of a project can also be considered as the effect of obsolescence resulting from technical progress. Technical progress will generally reduce earnings as the project has to compete with the later introduction of more advanced production methods.

9. Where firms, when assessing a project, do not make such allowances for declining earnings, they may instead set a figure for the minimum required rate of return which is higher than the return they expect to realise in fact. This method, of inflating the " planning " rate of return, is a very rough and ready, and frequently arbitrary, way of allowing for expected adverse changes in relative costs and prices. It is far preferable to make the best possible estimate of the likely trend of earnings after allowing for changes in wages in relation to prices (or—another facet of the same issue—after allowing for the competition to be expected from more advanced machinery as technical progress continues year by year) and for any other expected changes in relative prices and costs. In the following discussion, it is assumed that assessments of the likely earnings from any investment project during the course of its life allow for such factors. It may be possible to estimate the pattern of earnings only approximately, but it is assumed that a view will be taken of what may be called the " earnings profile " over an appropriate period of years.

10. Many firms attempt to allow for the tendency for the earning-power of an asset to fall during its life by calculating earnings (the return) net of an allowance for depreciation; but the methods of treating depreciation revealed by the surveys mentioned in paragraph 5 frequently appear to be faulty.

11. It is sometimes argued that the calculation of costs and revenues, and the determination of the expected rate of return required for a given project to be judged worthwhile, should also allow for the effects of any general inflation of the price level anticipated during the life of the project. This is a complex problem but, to the extent that inflation can be expected to have a similar effect on both costs and revenues, and on the margin between them, there seems to be no need to build the impact of overall inflation into the calculation. This is particularly so as the

main tax allowances are concentrated in the early years of the life of an asset. But whereas it is reasonable under present tax conditions to ignore the impact of general inflation, expected changes in relative prices (including changes in wages in relation to prices) must be taken into account, as has already been indicated above.

12. The general question then arises whether returns should be calculated before or after tax. It seems clear that after-tax assessment is infinitely preferable under the current United Kingdom tax system.

13. The incidence of tax on profits from investment in plant and machinery is today much lower than that on investment in buildings or working capital. The allowances which can now be claimed against tax liabilities are as follows:—

	New plant and machinery	*New industrial buildings*
Investment allowance	30% of cost ...	15% of cost
Initial allowance	10% of cost ...	5% of cost
Annual depreciation allowance	15%, 20% or 25% on the reducing annual balance	4% straight line

The allowances against investment in Development Districts are still more advantageous than those shown above. There are no allowances in respect of investment in stocks and working capital*.

14. If returns are calculated before tax, investments which appear to yield equal rates of return may, in fact, yield very different net after-tax rates of return—provided that these rates are properly calculated (for example, by using the "discounted cash flow" method advocated below). It is the after-tax return that provides the true measure of the profitability of his investment to the industrialist. Table 1 gives examples of the widely differing before-tax rates of return for representative projects of different types which could be the equivalent of a 7 per cent after-tax return.

15. The apparent paradox in the "all-plant" example in the first column of Table 1, of a 4¼ per cent return before tax being equivalent to 7 per cent after tax is deducted, reflects the fact that, with today's investment allowance, 130 per cent of the cost of new plant and machinery can be offset against tax liabilities and this offset can be made largely at the beginning of the tax-life of the asset. The allowances are effective only in the years when there are tax liabilities against which they can be set. Accordingly, their value is greatest for an existing firm already earning substantial profits on operations other than those connected with the new investment project, since it is thus able to reap the full benefit of the investment allowance on the new project with the minimum delay. For a firm only recently started in business (or one in which the investment in new plant is very large in relation to its business as a whole), there will normally be a delay in reaping the full benefit of the investment allowances. For such a firm, the before-tax return on all-plant projects may not be below, but it may be little above, the after-tax return. The second

* For further details of the allowances, see 106th Report of the Commissioners of H.M. Inland Revenue, Cmnd. 2283, pp. 36–37.

TABLE 1

SELECTED NOTIONAL INVESTMENT PROJECTS (*a*) (*b*)

Nature of project	Before-tax return(*c*) equivalent to 7 per cent after tax	
	Firm able to take immediate advantage of all tax allowances	Firm unable to offset allowances against tax on profits on other operations
All new plant	4¼%	7%
All new industrial buildings	11½%	11¾%
All stocks	15%	15%
A " mixed " project:— 60 per cent plant, 25 per cent industrial buildings and 15 per cent stocks (*d*) ...	9%	10¼%

(*a*) These are all projects with a 15 year life.

(*b*) In these examples, plant is assumed to have a nil scrap (or recovery) value; industrial buildings are assumed to have a value after 15 years equal to the book value as written down for tax purposes, and stocks to have a recovery value equal to original cost. The exact comparisons of before-tax and after-tax returns depend both on the expected life of the asset and on the way in which the earnings attributed to it decline over time. Income tax has been deducted at the recently foreshadowed rate of 8s. 3d.

(*c*) Calculated from before-tax earnings over 15 years, using the discounting methods described in paragraph 20.

(*d*) This is not necessarily a typical project; the shares of the various elements in it simply represent the recent pattern of gross investment in the economy as a whole.

column of Table 1 shows examples of the before-tax rates of return that would be required if a firm with no profits other than those from the new investment itself were to seek 7 per cent after tax.

16. The probability of there being wide differences in the margins between before-tax and after-tax returns on different types of project, demonstrated by the figures in Table 1, means that the calculation of return net of tax is highly desirable from the point of view of the investing firm. It is also apparent from these figures that calculation of returns on this basis must tend to encourage investment in modern plant and machinery, as compared with other types of capital formation (for example, buildings and stocks). The wider appreciation of the highly favourable tax treatment of such expenditures must be in the interest of the economy as a whole, provided that the structure of taxation and allowances is rational.

Techniques for measuring the rate of return

17. As has already been mentioned, there is abundant evidence that a wide range of methods of calculating the expected rate of return to an investment project are in use in British industry and that many of them are of dubious value.

18. The pay-back method normally estimates the period in which the expected operating profits from the project will add up to the amount spent on it. The quicker the original capital outlay is recouped, the higher will be the rating of the project. This method recognises that

early returns are preferable to those accruing later; but its weaknesses include the fact that it ignores returns accruing after the pay-back period. It thus provides no measure of the varying returns which different projects will give after the moment when the original capital is recovered.

19. Then, there are many variants of the "conventional" method of calculating the annual rate of return. One may relate the before-tax return, posssibly in an early year, either to the initial capital or to the average capital employed during the life of the plant. Other variants may attempt to calculate the rate of return after tax; all, neveretheless, have the disadvantages that they normally involve both the use of more or less arbitrary depreciation formulae and also great difficulty in taking proper account of the incidence of taxation.

20. Most of the disadvantages of such methods are avoided by the use of the "discounted cash flow" (DCF) technique*, which is now being adopted by many firms (though it is not always applied correctly). In principle, this method first establishes, on the one hand, the estimated cash expenditures (including tax payments) and, on the other, the estimated receipts (including any residual scrap value) expected in connection with the project over each year of its life. The differences between the receipts and the expenditures year by year constitute the net cash flow from the investment. To this cash flow in each year is then applied a discounting procedure. This procedure is necessary in order to bring into the calculation the true cost of the capital which will be locked up in the project. If the cost of capital is put at 7 per cent per annum under the discounting procedure, £107 receivable in a year's time is the equivalent of £100 today. On this basis, it is possible to calculate today's value of the cash flow expected from the project during its life: if this, when a 7 per cent discount rate is used, just equals the initial cost of the project, the implication is that the project is expected to earn sufficient to pay 7 per cent interest on the capital invested, in addition to recovering the cost of the initial investment by the end of its life.†

21. The two main advantages of the DCF method as a means of determining whether a given project is worthwhile, or for ranking alternative projects, may be summarised as follows:—

(*a*) it takes appropriate account of differences in the time-stream of net earnings over the expected life of the project and of the fact that £100 due today is worth more than £100 due a year later;

(*b*) it easily takes tax liabilities and allowances, and their timing, into account.

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* A. M. Alfred has recently published a paper on the use of DCF techniques, demonstrating their advantages over more conventional methods (see "Discounted Cash Flow and Corporate Planning", *Woolwich Economic Papers*, No. 3, 1964). A more comprehensive discussion of DCF methods is contained in A. J. Merrett and Allen Sykes, "The Finance and Analysis of Capital Projects" (Longmans Green, London, 1963). A clear exposition of the technique, related to American conditions, is given in H. Bierman and S. Smidt, "The Capital Budgeting Decision" (MacMillan, New York, 1964).

† If the problem is one of ranking projects in order of profitability, it is possible to use a variant of this method to establish for each one the present value of the expected earnings over the life of the project, calculated by discounting the after-tax earnings stream at the chosen rate—say, 7 per cent. The relative profitability of the various projects is then shown by the margins by which the present values of their expected returns exceed their original costs.

TABLE 2

£1,000 NOTIONAL PROJECT; ALL NEW PLANT; NO SCRAP VALUE; EXPENDITURE INCURRED IN YEAR 0, BUT NO PROFITS EARNED UNTIL YEAR 1
(All figures in columns A to F rounded to the nearest £)

Year	Gross profits before tax and depreciation	Tax on gross profits (*a*)	Tax allowances granted against gross profits (*b*)	Tax saved by allowances (*c*)	Net tax payable (*d*) (B minus D)	After-tax net cash flow (A minus E)	*Discount factor* (7%)	*Discounted value of column F* (F × G)
	A	B	C	D	E	F	*G*	*H*
1	159	—	600	293	−293	452	*0·935*	*422·2*
2	148	90	140	103	− 13	162	*0·873*	*141·1*
3	138	83	112	67	16	121	*0·816*	*99·0*
4	127	77	90	54	24	103	*0·763*	*78·7*
5	116	71	72	43	28	88	*0·713*	*62·5*
6	105	65	57	34	31	74	*0·666*	*49·5*
7	94	59	46	28	32	63	*0·623*	*39·0*
8	83	53	37	22	31	52	*0·582*	*30·5*
9	73	47	29	18	29	43	*0·544*	*23·5*
10	62	41	23	14	27	35	*0·508*	*17·8*
11	51	35	19	11	23	27	*0·475*	*13·0*
12	40	29	15	9	20	20	*0·444*	*9·1*
13	29	23	12	7	15	14	*0·415*	*5·8*
14	18	16	10	6	11	8	*0·388*	*3·0*
15	8	10	8	5	6	2	*0·362*	*0·7*
16	—	4	31	14	− 10	10	*0·339*	*3·3*
17	—	—	—	5	− 5	5	*0·317*	*1·5*
TOTAL	1,251	703	1,300	731	− 28	1,278		*1,000*
Return	4·3%(*e*)					7·0%		

(*a*) Income tax 41¼ per cent (8s. 3d. in the £), profits tax 15 per cent, total 56¼ per cent of column A lagged one year.

(*b*) Investment allowance 30 per cent in first year, initial allowance 10 per cent in first year, annual allowance 20 per cent of written down value in each year.

(*c*) Income tax saved, 41¼ per cent of allowances; profits tax saved, 15 per cent of allowances. However, the phasing year-by-year varies so that the figures in column D are not simply 56¼ per cent of those in column C. The figure of 293 in column D for year 1 is made up as follows:

	Income tax saved	*Profits tax saved*
	41¼%	15%
300 investment allowance	123·75	45·00
100 initial allowance	41·25	—
200 annual allowance	82·50	—
Total	247·50	45·00

In year 2, the income tax saved is 57·75 on the 140 annual allowance for that year; profits tax of 45 is saved on the 300 initial and annual allowances of year 1, making 102·75 (say 103) in total. In year 3, income tax is saved on the 112 annual allowance for that year and profits tax on the 140 annual allowance of year 2, and so on.

(*d*) A minus sign denotes a tax rebate, realizable immediately provided that profits on other operations incur a tax liability at least equal to these amounts.

(*e*) i.e. 4·3 per cent is the rate of discount which equates the stream of earnings shown in this column to a total value of £1,000.

22. Two major questions then arise:—

(*a*) Is the use of DCF methods likely to give results very different from those given by more conventional methods for assessing the return to, and the ranking of, projects?

(*b*) Is it practicable?

23. In answer to the first question, the example in Table 2 may be considered, of a £1,000 project yielding the returns shown over a fifteen-year life. This is a notional example of a plant with gradually declining gross earning power; and it is assumed that the investing firm has earnings from other parts of its business sufficient to enable it to take immediate advantage of all tax allowances. The before-tax earnings stream (column A) has been chosen, for illustrative purposes, so as to yield an after-tax cash flow (column F) giving a 7 per cent DCF rate of return—i.e. net earnings over its life which are just equal, when discounted at 7 per cent, to the initial cost of the project (see paragraph 20). Columns G and H show how the discounting procedure works (the figures in column G can be obtained from any book of discount tables).

24. The example is highly simplified in order to bring out the main points of the discussion. It has seemed reasonable to assume a plant in which earnings fall during its lifetime rather than to assume that the earnings from the plant are constant until it is replaced. The declining earnings used in the illustration are more or less typical of conditions under which technical progress leads to more efficient plant being developed year by year until, at the end of the fifteenth year, it pays to bring in a more modern piece of machinery. The plant that is then scrapped may still be physically usable, but the cost savings of the modern equipment would be sufficient to warrant its introduction and the scrapping of the old plant. The gradual narrowing of the margin of annual earnings which can be attributed to the plant throughout its life can equally be thought of as due to the gradual rise in money wages in relation to prices—this being the main way in which the gains from technical progress are experienced by individuals in the form of rising real incomes.

25. The shape of the earnings curve is a matter which must be considered in every case—whether it declines uniformly throughout the life of the plant, as in the example in Table 2, whether the earnings at first decline only slowly, or even for a time rise, and then fall more rapidly as the scrapping point approaches, or whether the pattern is that normally attributed to cars, for which the decline is rapid in the early years and slows down later. The earnings profile is important for any form of investment appraisal, and if no explicit assumption is made about the course of earnings, no satisfactory appraisal can be made. Yet at the same time it must be recognised that, since the earnings profile has to be estimated in advance, the method of estimation will usually have to be fairly simple. The inevitable inaccuracies of any judgments about the more distant future make it inappropriate to attempt too meticulous an attribution of earnings year by year in the later years of the plant's life.

26. Returning now to the particular example given in Table 2, it is apparent that there can be many different conventional ways of assessing

the return shown in Column A of the table. Some firms might see the total return for the £1,000 outlay as being £1,251, that is to say a total profit of £251 (after recovering the original outlay) over the fifteen years, which is an average profit of £17 a year; on the initial investment of £1,000 this is a return of 1¾ per cent before tax. Another firm might calculate the conventional return by regarding the average profit of £17 a year as related to the average capital employed—£500 (half the £1,000 to allow for the gradual recovery and writing down of the capital); the return could then be regarded as 3½ per cent before tax. There are other ways still of looking at the earnings in Column A. Some might say the return is 9¼ per cent; to get this figure, they might take depreciation as being £67 a year (i.e. £1,000 divided by 15), so that the profit in the first year would then be £92 (£159 less £67 depreciation), and they might then see the return on the investment as 9¼ per cent before tax. These three conventional approaches would thus give a before-tax return of 1¾ per cent, 3½ per cent or 9¼ per cent, according to the chosen way of looking at the figures—an illustration of the great variations in the assessment of the worth of a project that can arise from the widely differing conventional concepts of the rate of return. A more accurate way of assessing the before-tax return would be to apply the discounting method (referred to in paragraph 20) to the figures in Column A. It would then be found that the return was about 4¼ per cent, again before tax but after allowing for the recovery of the capital.

27. Any calculation of the return based on the figures in Column A of Table 2 gives the return on a before-tax basis; that is to say, it is the gross return out of which tax has to be paid, leaving a net, or after-tax, return to the investing firm (shown in Column F). It is frequently assumed that, with tax rates on company profits at around 50 per cent, the net, or after-tax, return is approximately half the gross return. This, however, is not the case. In the particular instance chosen, the tax payments of a company will be *reduced* as a result of investing in the plant, notwithstanding that it contributes additional profits. Because of this, and because the tax allowances accrue early in the life of the asset, the after-tax rate of return will be greater than the before-tax return—7 per cent against 4¼ per cent.

28. This is not an untypical result. Over a wide range, rates of return on projects including a high proportion of new plant and machinery are higher when calculated on an after-tax basis than when calculated before tax, *provided* that the investing firm is in a position to take immediate advantage of all tax allowances (see paragraph 15). On all projects including some new plant, machinery or industrial building the margin between before-tax and after-tax rates of return is always less than the standard rate of income and profits tax combined—i.e. is always less than 56¼ per cent.

29. Table 3 illustrates the before-tax rate of return which has to be secured to give 7 per cent after tax (on the assumption that immediate advantage can be taken of all tax allowances) in the case of:—

(i) new plant with a life of 10, 15 and 20 years; and

(ii) a mixed investment, including a proportion of industrial buildings and stocks as well as plant with a 10, 15 and 20 years' life.

It will be seen that the effect of the present tax allowances is most striking in the case of plants with shorter rather than with longer lives.

TABLE 3

GROSS BEFORE-TAX RETURN REQUIRED TO GIVE 7 PER CENT AFTER-TAX RETURN WITH PLANT OF DIFFERENT LIVES (*a*)

Type of Project	Life of Plant		
	10 years	15 years	20 years
(i) All new plant	2¼%	4¼%	6%
(ii) Plant (60 per cent), industrial buildings (25 per cent) and stocks (15 per cent) ...	8¼%	9%	9½%

(*a*) See footnotes (*b*) to (*d*) to Table 1. Figures here apply to firms able to take immediate advantage of all tax allowances.

30. Tax changes are always liable to take place, but this does not reduce the importance of appreciating their effect as soon as they are known. Even if future tax rates and allowances differ significantly from those now in force, this will not eliminate the importance of adequate estimation of the profile of gross earnings over time, of taking into account the impact of taxation and tax allowances and of applying a discounting technique in evaluating the expected future net cash flows.

31. The second question raised in paragraph 22 was whether the universal use of DCF methods is practicable. As has been indicated, an increasing number of firms are using such methods; and to the large company the preparation of practical guides, suited to its particular circumstances, for use by its staff need not present any serious difficulty*. But it is clear that the widespread employment of DCF methods by medium and small firms would be greatly facilitated if short-cut ready-reckoners were available, suitable for use in connection with British tax rates and allowances and offering a choice of "typical" earnings profiles, or if other forms of assistance were readily available. In the United States, G. Terborgh of the Machinery and Allied Products Institute (M.A.P.I.) has developed such a guide for use in assessing replacement projects in United States conditions†. A. J. Merrett and A. Sykes have started work on a similar guide for use in the United Kingdom. Furthermore, it would not be difficult to draw up computer programmes to make DCF calculations of after-tax rates of return available to companies prepared to provide their own estimates of gross earnings in the peak year and an approximation to the "earnings profile".

The "desirable" rate of return

32. It has been argued in the preceding paragraphs that growth will be slowed down if businessmen use incorrect methods for appraising and

* Such a guide, prepared for use by the staff of Courtaulds Ltd., is shortly to be published by Chapman and Hall.

† G. Terborgh, "Business Investment Policy" and supplements published by M.A.P.I.

ranking capital projects, since this is likely to lead to a less beneficial pattern of investment in the economy than could otherwise be achieved. In particular, many of the less satisfactory methods in current use may tend consistently to under-rate the benefits of investment in plant and machinery, both from the standpoint of the profitability of the individual firm and in relation to the priorities of national growth policies. But growth will also be slowed down if businessmen assess the relative profitability of projects correctly but require too high a minimum rate of return on new projects. When considering which to select from among alternative projects, it can be assumed that those promising the highest rates of return are the best both for the firm and for the community. If, however, the minimum rate of return, below which all projects are rejected, is set too high, some projects may be discarded which could both show an adequate return to the firm concerned and also raise the rate of increase of labour productivity and national income.

33. There is evidence that many firms in United Kingdom industry apparently look for rates of return of 15 per cent before tax, and sometimes more*. It is, of course, difficult to know the exact meaning of statements to this effect since, as has been indicated above, widely varying concepts of the "rate of return" are employed. However, it is possible that the rate used by many firms to screen investment projects is in fact far above the return normally secured on an industrial investment. It can be argued that most firms should aim to secure a minimum return on any project not less than what they could reasonably expect to earn by investing their money elsewhere; and the average return (in real terms) to industrial capital has been estimated by some investigators to fall within the range of 6–8 per cent after tax†. Without discussing the merits of this estimate, it will be assumed here that about 7 per cent after tax is, in fact, the average real return. It is a rate which includes the rewards for undertaking a normal degree of industrial risk. A rate of 7 per cent after tax would probably today be equivalent to some 9–10 per cent before tax on a "mixed" project such as that shown in Table 1; its before-tax equivalent could approach 12 per cent on all-buildings project, and could be as low as 4¼ per cent on a project consisting of plant alone.

34. It can also be argued that firms should not ordinarily use a minimum rate of return (in conjunction with correct methods of investment appraisal) much above the after-tax rate typically earned (here assumed to be 7 per cent), at least for projects which carry no more than normal risk—for example, replacement projects intended to reduce costs of production but not greatly to expand output in relation to the expected growth of the total market for the product. Riskier investment—involving, for example, the launching of a new product or expansion into a new foreign market—may justify a higher planning rate of return even if, as

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* See Report of the Centre for Business Research, Manchester University, *op. cit.*

† These figures are in real terms (i.e. returns in constant prices) and include real capital appreciation. The returns in money terms realised in inflationary conditions would normally be higher. For arguments in support of these figures see A. M. Alfred, *op. cit.* and A. J. Merrett and A. Sykes, "Return on Equities and Fixed Interest Securities 1919–1963", *District Bank Review*, December, 1963, and "The Finance and Analysis of Capital Projects," (Longmans Green, London, 1963).

is highly desirable, the best possible allowance for uncertainty has been made in estimating the likely flows of costs and earnings*.

35. If firms which are not undertaking especially risky investment nevertheless use a minimum rate of return substantially higher than the average that is achieved (as would be the case if a 15 per cent before-tax return were used as a minimum requirement when deciding upon investment involving a substantial proportion of plant and machinery), growth may be hindered in a number of ways. First, in those firms which are able to administer the prices of their output, prices may be set high in relation to costs, in an attempt to make the actual return from new plant equal to the high planning rate; and this high price level, in addition to other harmful effects, would also make it possible to work obsolete plant at a profit—which would discourage replacement and reduce efficiency. Moreover, even in a fully competitive market the minimum rate of return sought by a significant proportion of investors must influence prices in the long run. Secondly, if industrialists set high planning rates of return in the expectation that they will not in fact be able to achieve a reasonably high level of production in relation to capacity, they may then, through their pricing policies, create a situation in which the continuance of spare capacity is inevitable and the excess of planning rates over the realised rates is perpetuated in a kind of vicious circle. Finally, the encouragement given by a high rate to plan expansion of output on a more labour-intensive and less capital-intensive basis than would be the case with a lower rate may imply a distortion of the optimum pattern of use of labour and capital.

36. It may, however, be argued that the acceptance by a significant part of British industry of a minimum rate of return to investment in plant and machinery lower than that customary today would, first, lead to an increased total demand for investment resources and, secondly, require a higher rate of saving out of national income in order to release additional resources for investment. But, as has been indicated in paragraph 1 above, economic growth in the United Kingdom is now particularly dependent on the maintenance of a high rate of productivity-raising investment, and anything which results in a faster growth of labour productivity—for example, quicker displacement of old plant by new, with a successful redeployment of manpower—can lead to a faster growth of national output, out of which a bigger volume of savings and investment will be available. While this virtuous circle, once started, would help in maintaining higher investment and faster growth, there may yet be a problem of ensuring additional savings in the initial stages to match any immediate additional investment that might result from the widespread

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* It may be that in some cases investors are obliged to seek a higher minimum rate of return, as a consequence of weaknesses in the institutional machinery for investment financing which result in the marginal cost of finance to the investor being above the average return after tax to industrial capital. In such a situation, the importance of correct assessment of the returns to be expected from all potential projects is not, of course, reduced (it may even be enhanced); but the required minimum rate of return below which all projects are rejected will be higher than for other investors. Moreover, it may be an over-simplification to assume that the amount of finance that can be raised and its cost are, in practice, independent of the purpose of the investment.

adoption of the methods of investment appraisal discussed here. But, quite apart from the question of any additional investment, the adoption of more rational and consistent criteria for investment decisions throughout British industry would be of great benefit by improving the pattern of use of investment resources.

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NATIONAL ECONOMIC DEVELOPMENT COUNCIL

Investment Appraisal

LONDON
HER MAJESTY'S STATIONERY OFFICE
1965

FOREWORD

This report on investment appraisal was presented to the National Economic Development Council by Sir Robert Shone, Director General, on 2nd December, 1964. The Council considered that the issues raised should be more widely discussed. It has been revised and is now published.

The booklet follows earlier work on the impact of taxation, and other matters bearing on investment decisions, which were referred to briefly in the taxation section of the Council's report " Conditions Favourable to Faster Growth " published in April, 1963. Since then the report of the Richardson Committee and other evidence have suggested that certain factors which are, in principle, relevant to investment decisions were either not being taken fully into account by industrialists, or if taken into account were treated in widely differing ways by different companies. This booklet discusses some of these matters and suggests methods of appraising investment proposals which would bring out more systematically and reliably the advantages of investing in new plant and machinery where it will increase efficiency, and thus help to secure faster growth.

The case for improved methods of investment appraisal and the description of these methods have both been given only briefly and a number of qualifications of some practical importance have been omitted. The issues raised will now be pursued with the Economic Development Committees in the context of their concern with investment for growth and with efforts to increase efficiency. There is also a necd for detailed practical advice to firms on ways of applying improved methods of investment appraisal to their particular circumstances. On this and other aspects of the subject more work needs to be done, and the National Economic Development Office will do all it can to encourage and to co-operate in such work.

The changes in the taxation system recently foreshadowed, under which a corporation tax and a capital gains tax are to be introduced, will affect the practical application of the proposals outlined in this booklet. But under any system which includes tax arrangements designed to encourage investment in improved equipment, the matters dealt with will continue to be important.

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